

**WHAT IS CLAIMED IS:**

1                   1.     A substantially water-soluble polymer comprising a first subunit  
2 comprising a first nucleic acid, wherein said first subunit is incorporated into said  
3 polymer using a first subunit precursor comprising said first nucleic acid and an ethylene-  
4 containing moiety.

1                   2.     The polymer according to claim 1, wherein said first subunit is  
2 covalently attached to a second subunit.

1                   3.     The polymer according to claim 1, further comprising a cleavable  
2 moiety.

1                   4.     The polymer according to claim 3, wherein said cleavable moiety  
2 is located between said first subunit and said second subunit.

1                   5.     The polymer according to claim 3, wherein said cleavable moiety  
2 is a member selected from groups cleaved by change in pH, enzymatic action, reduction,  
3 oxidation, light, heat and combinations thereof.

1                   6.     The polymer according to claim 5, wherein said cleavable moiety  
2 is cleaved by a process occurring in a biological system.

1                   7.     The polymer according to claim 6, wherein said cleavable moiety  
2 is a member selected from disulfides, esters, phosphodiester and combinations thereof.

1                   8.     The polymer according to claim 1, wherein said first subunit  
2 further comprises a linker group adjoining said first nucleic acid and said ethylene-  
3 containing moiety.

1                   9.     The polymer according to claim 8, wherein said linker arm  
2 comprises a cleavable moiety.

1                   10.    The polymer according to claim 8, wherein said cleavable moiety  
2 is a member selected from groups cleaved by change in pH, enzymatic action, reduction,  
3 oxidation, light, heat and combinations thereof.

11. The polymer according to claim 9, wherein said cleavable moiety is cleaved by a process occurring in a biological system.

12. The polymer according to claim 10, wherein said cleavable moiety is a member selected from disulfides, esters, phosphodiester and combinations thereof.

13. The polymer according to claim 1, wherein said ethylene-containing moiety comprises a member selected from  $\text{—CH}_2\text{=CHX}^1$ ,  $\text{—CH}_2\text{=CX}^2\text{Y}^1$  and combinations thereof, wherein

$\text{X}^1$ ,  $\text{X}^2$  and  $\text{Y}^1$  are members independently selected from H, (=O),  $\text{—NR}^1\text{R}^2$ ,  $\text{—OH}$ , and  $\text{—OR}^3$ , wherein

$\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are members independently selected from H, alkyl, substituted alkyl, aryl and substituted aryl.

14. The polymer according to claim 13, wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are independently selected from H, alkyl and substituted alkyl.

15. The polymer according to claim 14, wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are independently selected from H, alkyl and alkyl substituted with at least one moiety selected from  $\text{—OH}$ ,  $\text{—O—}$  and combinations thereof.

16. The polymer according to claim 15, wherein at least one of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  comprises a moiety selected from poly(ethyleneglycol), poly(propyleneglycol) and combinations thereof.

17. The polymer according to claim 1, wherein said polymer comprises a member selected from acrylate, acrylamide,  $\text{C}_1\text{—C}_6$  alkylacrylate, (alkyl)acrylamide, methylmethacrylate, triethyleneglycolmethacrylate, poly(ethyleneglycol)methacrylate, hydroxyethylmethacrylate, glycerylmethacrylate, vinyl alcohol, ethylcyanoacrylate and combinations thereof.

18. The polymer according to claim 1, further comprising a tissue-specific targeting moiety.

19. The polymer according to claim 1, further comprising a moiety that enhances cellular uptake.

1                   20.     The polymer according to claim 1, further comprising a nucleic  
2     acid compacting moiety.

1                   21.     The polymer according to claim 1, wherein said first nucleic acid is  
2     hybridized to a second nucleic acid.

1                   22.     The polymer according to claim 21, wherein said first nucleic acid  
2     is a single-stranded nucleic acid.

1                   23.     The polymer according to claim 21, wherein said first nucleic acid  
2     is a double-stranded nucleic acid.

1                   24.     The polymer according to claim 22, wherein said second nucleic  
2     acid is a double-stranded nucleic acid.

1                   25.     The polymer according to claim 23, wherein said second nucleic  
2     acid is a single-stranded nucleic acid.

1                   26.     The polymer according to claim 1, wherein said polymer is a  
2     homopolymer of said first subunit.

1                   27.     The polymer according to claim 1, wherein said polymer is a  
2     copolymer of said first subunit and a second subunit.

1                   28.     The polymer according to claim 27, wherein said second subunit  
2     comprises a third nucleic acid.

1                   29.     The polymer according to claim 28, wherein said third nucleic acid  
2     has a sequence different from that of said first nucleic acid.

1                   30.     A polymeric particle comprising a first subunit comprising a first  
2     nucleic acid, wherein said first subunit is incorporated into said polymer using a first  
3     subunit precursor comprising an ethylene-containing moiety.

1                   31.     The particle according to claim 30, wherein said first subunit  
2     further comprises a linker group adjoining said first nucleic acid and said ethylene-  
3     containing moiety.

1                   32.     The particle according to claim 31, wherein said linker arm  
2 comprises a cleavable moiety.

1                   33.     The particle according to claim 31, wherein said cleavable moiety  
2 is a member selected from groups cleaved by change in pH, enzymatic action, reduction,  
3 oxidation, light, heat and combinations thereof.

1                   34.     The particle according to claim 32, wherein said cleavable moiety  
2 is cleaved by a process occurring in a biological system.

1                   35.     The particle according to claim 33, wherein said cleavable moiety  
2 is a member selected from disulfides, esters and combinations thereof.

1                   36.     The particle according to claim 30, wherein said ethylene-  
2 containing moiety comprises a member selected from  $-\text{CH}_2=\text{CHX}^1$ ,  $-\text{CH}_2=\text{CX}^2\text{Y}^1$  and  
3 combinations thereof, wherein

4                    $\text{X}^1$ ,  $\text{X}^2$  and  $\text{Y}^1$  are members independently selected from H, (=O),  $-\text{NR}^1\text{R}^2$ ,

5  $-\text{OH}$ , and  $-\text{OR}^3$ , wherein

6  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are members independently selected from H, alkyl,  
7 substituted alkyl, aryl and substituted aryl.

1                   37.     The particle according to claim 36, wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are  
2 independently selected from H, alkyl and substituted alkyl.

1                   38.     The particle according to claim 37, wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are  
2 independently selected from H, alkyl and alkyl substituted with at least one moiety  
3 selected from  $-\text{OH}$ ,  $-\text{O}-$  and combinations thereof.

1                   39.     The particle according to claim 38, wherein at least one of  $\text{R}^1$ ,  $\text{R}^2$   
2 and  $\text{R}^3$  comprises a moiety selected from poly(ethyleneglycol), poly(propyleneglycol) and  
3 combinations thereof.

1                   40.     The particle according to claim 30, wherein said polymer  
2 comprises a member selected from acrylate, acrylamide,  $\text{C}_1\text{-C}_6$  alkylacrylate,  
3 (alkyl)acrylamide, methylmethacrylate, triethyleneglycolmethacrylate,

4 poly(ethyleneglycol)methacrylate, hydroxyethylmethacrylate, glycerylmethacrylate, vinyl  
5 alcohol, ethylcyanoacrylate and combinations thereof.

1 41. The particle according to claim 30, further comprising a tissue-  
2 specific targeting moiety.

1 42. The particle according to claim 30, further comprising a moiety  
2 that enhances cellular uptake.

1 43. The particle according to claim 30, further comprising a nucleic  
2 acid compacting moiety.

1 44. The particle according to claim 30, wherein said first nucleic acid  
2 is hybridized to a second nucleic acid.

1 45. The particle according to claim 44, wherein said first nucleic acid  
2 is a single-stranded nucleic acid.

1 46. The particle according to claim 44, wherein said first nucleic acid  
2 is a double-stranded nucleic acid.

1 47. The particle according to claim 45, wherein said second nucleic  
2 acid is a double-stranded nucleic acid.

1 48. The particle according to claim 46, wherein said second nucleic  
2 acid is a single-stranded nucleic acid.

1 49. The particle according to claim 30, wherein said polymer is a  
2 homopolymer of said first subunit.

1 50. The particle according to claim 30, wherein said polymer is a  
2 copolymer of said first subunit and a second subunit.

1 51. The particle according to claim 50, wherein said second subunit  
2 comprises a third nucleic acid.

1 52. The particle according to claim 51, wherein said third nucleic acid  
2 has a sequence different from that of said first nucleic acid.

1                   53.     The particle according to claim 30, wherein said particle is  
2 substantially water-soluble.

1                   54.     The particle according to claim 30, wherein said particle is  
2 substantially water-insoluble.

1                   55.     The particle according to claim 30, further comprising a bioactive  
2 compound encapsulated by said polymer.

1                   56.     A pharmaceutical formulation comprising a pharmaceutically  
2 acceptable carrier and a substantially water-soluble polymer comprising a first subunit  
3 comprising a first nucleic acid, wherein said first subunit is incorporated into said  
4 polymer using a first subunit precursor comprising said first nucleic acids and an  
5 ethylene-containing moiety.

1                   57.     A pharmaceutical formulation comprising a pharmaceutically  
2 acceptable carrier and a polymeric particle comprising a first subunit comprising a first  
3 nucleic acid, wherein said first subunit is incorporated into said polymer using a first  
4 subunit precursor comprising said first nucleic acid and an ethylene-containing moiety.

1                   58.     A method for treating or preventing a condition, the method  
2 comprising administering to a subject a substantially water-soluble polymer in an amount  
3 effective to treat or prevent said condition, said polymer comprising a first subunit  
4 comprising a first nucleic acid, wherein said first subunit is incorporated into said  
5 polymer using a first subunit precursor comprising said first nucleic acid and an ethylene-  
6 containing moiety.

1                   59.     A method for treating or preventing a condition, the method  
2 comprising administering to a subject a polymeric particle in an amount effective to treat  
3 or prevent said condition, said particle comprising a first subunit comprising a first  
4 nucleic acid, wherein said first subunit is incorporated into said polymer using a first  
5 subunit precursor comprising said first nucleic acid and an ethylene-containing moiety.

1                   60.     A method for introducing a polynucleotide into a eukaryotic cell in  
2 a living animal comprising contacting the cell with a composition comprising:

3 a substantially water-soluble polymer comprising a first subunit  
4 comprising a first nucleic acid, wherein said first subunit is incorporated into said  
5 polymer using a first subunit precursor comprising said first nucleic acid and an ethylene-  
6 containing moiety.

1 61. The method of claim 60, wherein said composition is administered  
2 in an amount comprising about 0.5 µg to 20 mg of nucleic acid.

1 62. The method of claim 60, wherein the eukaryotic cell is a  
2 mammalian cell.

1 63. The method of claim 60, wherein the composition is administered  
2 by a route selected from the group consisting of oral, transdermal, systemic and inhalation  
3 routes.

1 64. The method of claim 63 wherein the composition is administered  
2 transdermally by high velocity impaction administration to the skin surface.

1 65. A method for introducing a polynucleotide into a eukaryotic cell in  
2 a living animal comprising contacting the cell with a composition comprising:  
3 a polymeric particle comprising a first subunit comprising a first nucleic  
4 acid, wherein said first subunit is incorporated into said polymer using a first subunit  
5 precursor comprising said nucleic acid and an ethylene-containing moiety.